R E P O R T R E S U M E S

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SCIENCE IN THE ELEMENTARY SCHOOL, GRADE 5, A GUIDE FOR TEACHERS.

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A COURSE OF STUDY FOR SCIENCE IN THE FIFTH GRADE IS DESCRIBED. DIVISIONS ARE (1) AN INTRODUCTION WHICH PROVIDES A RATIONALE FOR THE GUIDE AND LISTS THE MAJOR CONCEPTS, (2) A SECTION WHICH LISTS THE SPECIFIC SCIENCE CONCEPTS FOR EACH LESSON AND GIVES THE SCOPE AND SEQUENCE FOR GRADES THREE TO SIX, AND (3) A SECTION WHICH PRESENTS FOUR UNITS. THE UNITS ARE (1) ANIMALS, (2) SPACE AND EARTH SCIENCE, (3) PLANTS, AND (4) MATTER, ENERGY, AND MACHINES. INTERSPERSED ARE NINE LESSONS ON THE INTERRELATIONSHIP OF PLANTS AND ANIMALS WITH THEIR ENVIRONMENT. SPECIFIC CONCEPTS, OBJECTIVES, STUDENT EXPERIENCES, INSTRUCTIONAL MATERIALS, AND AUDIOVISUAL AIDS ARE LISTED FOR EACH LESSON. SOURCES OF INSTRUCTIONAL MATERIALS AND AUDIOVISUAL AIDS ARE PROVIDED. THE GUIDEBOOK WAS DESIGNED FOR USE WITH EDUCATIONAL TELEVISION BUT IS NOT LIMITED TO THIS USAGE. THE GUIDE IS ONE OF FOUR. THE OTHERS COVERING GRADES THREE, FOUR, AND SIX. (DS)

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GRADE 5

A GUIDE FOR TEACHERS

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APR 1 0 1967

SCIENCE IN ELEMENTARY EDUCATION

GRADES 3-6

A GUIDE FOR TEACHERS

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FOREWARD

Science must be brought to the child at an early age because of the great scope of science and our dependence upon science as a way of life. The media through which this process will operate in conjunction with this Course of Study will be the television. As long as it remains accurate, sincere, and interesting, educational television will take its legitimate place as a tool for public education in science. Printed words and pictorial illustrations are the best means of carrying science to the public. With this Course of Study as a guide and educational television as a transmitter, it can develop the learner's enthusiasm in acquiring the necessary knowledge and skill to enable him to deal with his life and environment as our society requires in this world of today. The advantages of educational television instruction are obvious in science, as this subject lends itself well in explaining and showing the problems of science.

We wish to thank all of the elementary teachers, both from our faculty and the cooperating schools, who made outstanding contributions in the development of this course of study. Many have graciously given of their time and talents as this program was being prepared.

We are fortunate to have had the important supervision and outstanding assistance of Dr. Robert W. Plants and Dr. J. David

Mohler of the School of Education of the University of Mississippi.

This Course of Study should do much toward bringing direct simple answers to the many questions that arise as we work together in bringing to the children the experiences and the joys of discovery. We trust this will be helpful to you in your teacher-learning environment.

Mrs. James L. Taylor
Educational Television Science Teacher

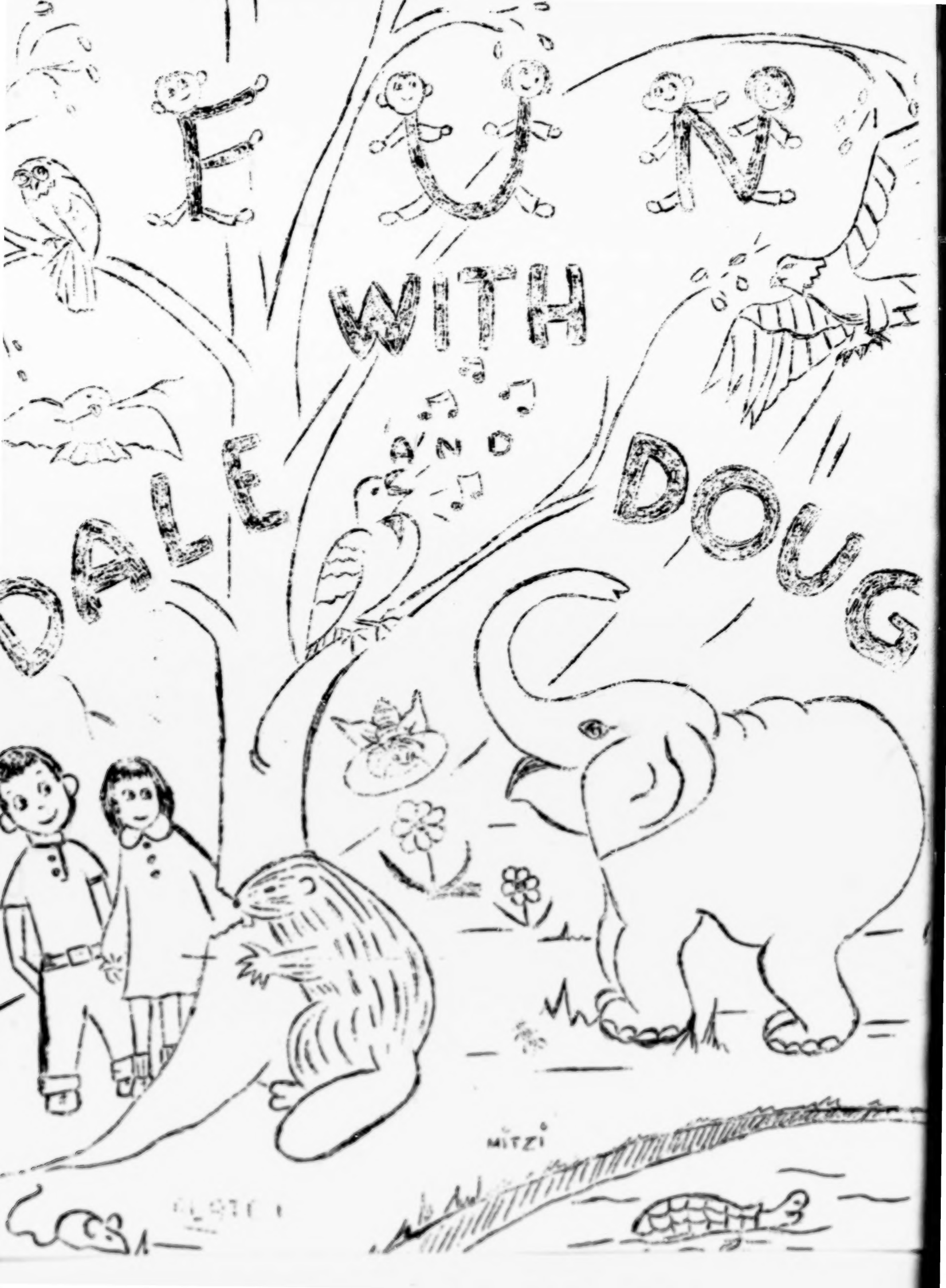
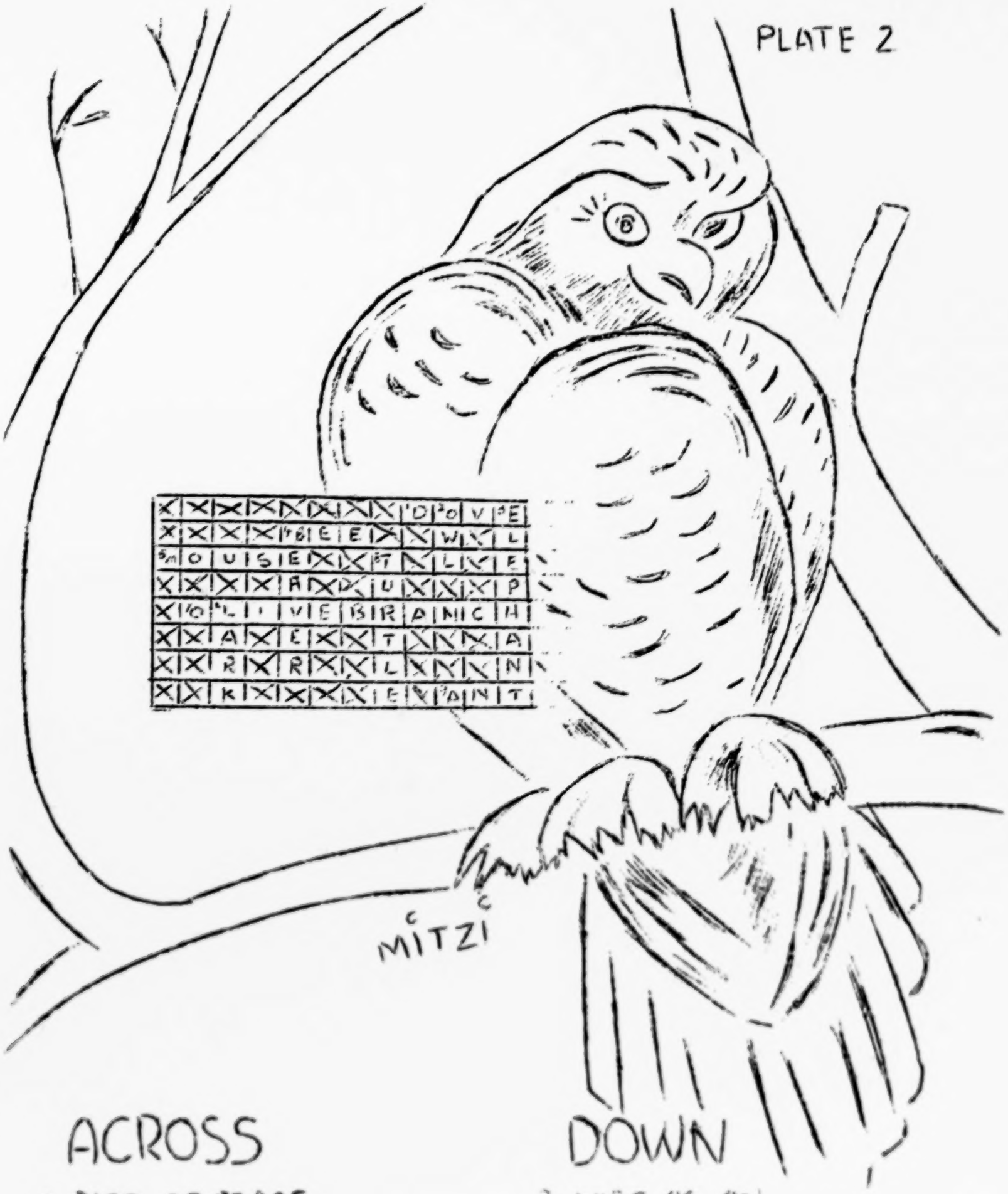

WITH
AND
DOUG
MITZI

PLATE 2



ACROSS

1. BIRD OF PEACE
4. BUSY AS A ___.
5. QUIET AS A _____.
7. BRANCH THE DOVE CARRIES
9. INDUSTRIOUS AS AN ___.

DOWN

2. WISE AS AN _____.
3. LONG REMEMBERING AS THE_
4. AN EAGER ____
6. HAPPY AS A ____ .
8. DETERMINATION OF THE _.

I

INTRODUCTION

Science is being scrutinized because of its advance in technology. Modern attitudes in science are going through radical changes. There is a definite movement for children to learn and infer from their own observations. The educational system must convey traditional knowledge and culture as well as emphasize inquisitiveness and mental flexibility to the younger generation. This will help to free them for more challenging work that requires visions that will be adaptable to the new and future ideas. The present knowledge we have of science serves as a guide and not as a goal for the students' studies.

Science is of great interest to children. "The problem is not one of creating interest in science, rather, science programs must be built so that both the pre-existing interest and its natural curiosity about science, are fostered and cultivated in children."[1]

Children build their own concepts regardless of the teaching they receive. This Course of Study is to guide them in their observations, clarify their present concepts, and help them build basically sound concepts.

---

[1]Harold E. Tannenbaum, Science Education for Elementary School Teachers, Boston: Allyn and Bacon, Inc., 1965, p. 55.

The children must develop in a logical sequence as they go through the grades. They must be aided in this gaining new concepts based on previously acquired knowledge along with their new learning experiences.

The living area is further divided into six lessons on animals and four in plants. The non-living are divided into space and earth science, with six lessons, matter, energy and machines with seven lessons. There are seven lessons on interrelationship of animals and plants with their environment.

Finally there is the area of motivation through teacher interest. Here is the factor which, though most important, is most likely to be a stumbling block. Many teachers grew up in schools where science, if it was taught at all, was a "sitting down, a reading, or a memorizing subject." The spark which, as children, they had for this area of learning was extinguished by sad school experiences. Teachers need to rekindle this spark in themselves. Only if they can develop a real interest in science can they nurture this interest in children.[2]

The student is not expected to grasp all of the factual material presented in the programs. The purpose of these programs

---

[2]Ibid., p. 57-58

is to give an overview of the unity of all science and to develop an interest and curiosity on the part of the student in the things of science. It is relatively unimportant whether the student retains the majority of the details.

The purpose of this enrichment program is to introduce and broaden the basic aspects of science and the methods the scientists use. The biological and physical sciences are considered separately but are combined admirably in interrelated lessons. The living, biological science programs consider the animal for the fall study and the plant for the spring study. The fall is adaptable to studying animals while the spring time of year is especially adaptable to the study of plants. The earth sciences are studied during the winter to correlate noticeable weather changes, while matter, energy, and machines are adaptable any time of the year, so late spring was chosen.

It is not the intent of the course subject matter to duplicate the material found in the texts. It attempts to utilize the principles undertaken in the previous years and prepare a foundation for concept development in the forthcoming years.

All aspects of science are interrelated; a study of one field leads to an understanding of the others.

II

MAJOR CONCEPTS

A. Some things are living and some non-living.

1. Biology is the study of living things.
2. Zoology is the study of animals.
3. Botany is the study of plants.

B. To classify means to put in a group things that are alike in some way.

1. Living things are put together in one group because they have characteristics that set them apart from non-living things.
2. Living things are classified on the basis of structure in two large groups---plants and animals; these groups are divided into smaller groups; these in turn are divided into still smaller groups, and so on, down to individual species.
3. Some things on this earth are living and others are non-living.
4. Living things have special characteristics that separate them from the non-living.
5. Non-living things can be found to have some of the characteristics of the living.
6. Living things have a definite form and size.
7. Non-living things may be any size.
8. Living things have a definite length of life (except for disease and accident).
9. Living things are in a state of constant activity and depend upon a constant supply of vital energy to carry on their activities while non-living things are not in a state of constant activity and do not need a supply of energy.
10. All living things are either plants or animals.
11. Living things are able to move by themselves, take in oxygen or carbon dioxide from the air, use food, grow, reproduce like kind, and respond to stimuli.

C. All living things are made of cells.

1. Cells grow and divide.
2. Animals differ from plants in the structure of their cells.
3. Cells are grouped into tissues and tissues into organs.
4. Because of these organs all living things are called organisms.
5. The common activities of plants and animals are called life processes.

6. Plants have cell walls that make the plants stiff.
7. Animals have cell walls that make the animal flexible.

D. Most animals move about in search of food, shelter, and protection from their enemies.

1. Plants remain rooted in one place and must be equipped to withstand changes in temperature and to obtain their food.
2. All living things need oxygen but they get it in different ways; while green plants use carbon dioxide as well as oxygen.
3. Living things must have food, water, and warmth to stay alive.
4. Animals either eat plants or other animals for food.
5. Those plants that are green make their own food.
6. Some plants get their food from decaying plants and animals.
7. Living things have adaptations that help them to get the things that they need.

E. Living things grow from the inside while non-living things grow from the outside.

F. Living things have certain characteristics.

1. Living things grow by taking in food and making it a part of themselves.
2. Living things resemble their parents.
3. Plants and animals respond to outside influences in different ways.

G. Many things are non-living.

1. Rocks and minerals are non-living.
2. Wind moves but is not alive.
3. Machines move but are not alive.
4. Light and sound are forms of energy.

III

EXPERIENCES

A. Have the children tell the important differences in some living and non-living things they named.

B. Compare common animals and plants with other objects giving the differences between them.

C. Discuss the things that are necessary to stay alive.

D. Note when a living thing is no longer living as a tree being made into a table.

E. Illustrate that growth is a kind of movement by placing a plant so that its leaves are away from the light. After a few days note the direction of the leaves.

F. Note that the wind moves but that it lacks some of the other characteristics of the living.

G. Illustrate how the things that are needed are obtained by different adaptations.

H. Have the children breathe deeply then exercise and compare the number of times they breathe.

I. Observe the breathing of a fish in an aquarium.

J. Examine the stems of plants, such as cattails, to see the hollow stems through which air passes to the roots.

K. Ask the children to bring pictures of different animals. Discuss their food, their adaptations to get the food they need and the parts of their bodies that help them.

L. Illustrate how a green plant makes food by placing a plant in a dark place for a few days then placing it in the sunlight.

M. Show how green plants store excess food in roots (carrots, stems, potatoes) and leaves (lettuce).

N. Ask the students to trace the origin of one of the foods they had for breakfast.

O. Observe the cell of an animal and plant under the microscope.

P. Note the rolling snowball and the crystal growing. They lack some of the other characteristics of the living.

Q. Illustrate the manner in which some cells bring water to the leaves of the plant by placing a stalk of celery in water which has food coloring or ink added.

R. Show that all life depends upon the sun. Illustrate that a plant will die if it does not have sunlight and that all animals indirectly depend upon plants for food.

S. Let the children study the growth of a plant or reproduction by propagating plants by seeds, runners, cuttings, or leaves.

T. Study the resemblances of offsprings to parents by showing pictures.

U. Obtain frog's eggs, place in an aquarium, and watch the development until the tadpole emerges.

V. Examine a rock collection to decide if it is living or non-living.

W. Study simple machines to learn their characteristics.

X. Run experiments with light and sound to prove that they are not alive.

ANIMAL KINGDOM

TURTLE

CHORDATA

SPIDER

ARTHROPODA

SNAIL

MOLLUSCA

EARTHWORM

ANNELIDA

STARFISH

ECHINODERMATA

HOOKWORM

NEMATHELMINTHES

PLAYTHELMINTHES

TAPEWORM

PORIFERA

COELENTERATA

JELLYFISH

BATH SPONGE

PROTOZOA

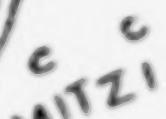


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PLATE 3

PLANT KINGDOM

DAISY

ANGIOSPERMS

SPERMATOPHYTES

GYMNOSPERMS

CONIFER

FERNS

PTERIDOPHYTES

BRYOPHYTES

MOSSES

FUNGI

MUSHROOM

THALLOPHYTES

ALGAE

RED ALGAE

MITZI

PLATE 4

SCOPE AND SEQUENCE

WEEK	GRADE 3	GRADE 4	GRADE 5	GRADE 6
1	Introduction	Introduction	Introduction	Introduction
	UNIT I ANIMALS			
	GROUP	GROUP	GROUP	GROUP
2	10-man	9-insect	10-man	10-man
3	9-insect	10-man	9-insect	9-insect
4	9-Arachnida	9-Crustacea	9-Myriapoda	9-Insecta
5	1 and 2 one cell - two layer	3 and 6 prickly - spiny	4 and 5 flatworm - roundworm	7 and 8 sectionworm - Mollusk
6	10-birds	10-reptiles	10-amphibians	10-fish
7	10-mammals	10-mammals	10-mammals	10-mammals
8	10-pets	10-pets	interrelated	interrelated
9	interrelated	interrelated		

PLATE 5

UNIT
XI
SPACE - EARTH

10	space-solar system	space-constellations	space-milky way	space-zodiac
11	space-moon	space-time	space-time	space-time
12	earth-weather	earth-watercycle	earth-precipitation	earth-winds
13	interrelated-safety	interrelated-safety	interrelated-safety	interrelated-safety
14	earth-dinosaurs	earth-changing	earth-rocks, minerals	earth-rocks
15	earth-lithosphere	earth-volcanoes	earth-earthquakes	earth-mountains
16	earth-ocean floor	esrth-oceans	earth-ocean floor	earth-glaciers
17	interrelated-seashore	interrelated-desert	interrelated-ponds	interrelated-forests

UNIT
III*
PLANTS

18	1-simplest, non-green	1-simplest, non-green	1-non-green	1-non-green
19	1-simplest, green	2 - 2nd simplest, green	3-reproduction spores	4-flowering
20	4-function, seed	4-function, stem	4-evergreen	4-function, flower
21	4-function, root	4-special adaptation	4-function, leaf	interrelated-partners
22	interrelated-adaptation	interrelated-adaptation	interrelated-partners	interrelated-emergencies

*For the sake of simplicity the naming of the groups are not consistent as to phylum, class, or order.

PLATE 8

UNIT
IV
MATTER, ENERGY, MACHINES

23	matter-atom	matter-elements	matter-molecules	matter-water
24	poison	poison	no lesson	no lesson
25	science fair	science fair	matter-molecules	matter-changes
26	energy-magnets	energy-electricity	energy-electricity	energy
27	energy-electricity	energy-electricity	energy-electricity	energy-electricity
28	energy-light	energy-light	energy-light	energy-light
29	energy-sound	energy-sound	energy-sound	energy-sound
30	machines	machines	machines	machines
31	Mississippi	Mississippi	Mississippi	Mississippi
32	Evaluation	Evaluation	Evaluation	Evaluation

PART THREE

GRADE FIVE

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PLATE 9

CONCEPTS IN SCIENCE

PART THREE

GRADE FIVE

Introduction

General Concepts

Experiences

Lesson One

Concept: Some things are living and other things are non-living.

UNIT ONE

LIVING THINGS

ANIMALS

Introduction

Major Concepts

Experiences

Lesson Two

Concept: Bad posture is almost entirely due to improper muscle habits.

Lesson Three

Concept: Ants are one of the most highly developed species of the insect world.

Lesson Four

Concept; There are four kinds of arthropods.

Lesson Five

Concept: Flatworms can exist in the livers of men and domestic animals, while others may live in the intestines. Those that are parasites do much harm.

Lesson Six

Concept: Amphibians spend their early lives in water and much of their adult lives on land.

Lesson Seven

Concept: Mammals have the most highly developed bodies of all animals.

Lesson Eight
(Interrelated)

Concept: A saltwater aquarium in the classroom offers pupils variety of activities which lead to scientific learning.

UNIT TWO

NON-LIVING THINGS

SPACE-EARTH

Introduction

Major Concepts

Experiences

Lesson Nine

Concept: The Milky Way is a huge system of stars, dust, and gas.

Lesson Ten

Concept: There are many timekeepers of life.

Lesson Eleven

Concept: The ends of the earth are our weather factories, and their influence on the lands nearer the center is very pronounced.

Lesson Twelve
(Interrelated)

Concept: Laws must be learned and observed.

Lesson Thirteen

Concept: Rocks are grouped according to the ways in which they were formed.

Lesson Fourteen

Concept: A sudden movement of part of the crust of the earth is called an earthquake.

Lesson Fifteen

Concept: The surface of the earth beneath the oceans is not flat.

Lesson Sixteen
(Interrelated)

Concept: There is a web of life in a pond or swamp.

UNIT THREE

LIVING THINGS

PLANTS

Introduction

Major Concepts

Experiences

Lesson Seventeen

Concept: **Fungi, the simplest group of plants, depend on other things for food.**

Lesson Eighteen

Concept: Mosses and ferns are more complex than the fungi.

Lesson Nineteen

Concept: Conifers are plants that produce seeds that grow in cones.

Lesson Twenty

Concept: Green plants perform special functions without which life could not go on.

Lesson Twenty-One

Concept: Partnerships are for the good of each partner.

UNIT FOUR

NON-LIVING THINGS

MATTER-ENERGY-MACHINES

Introduction

Major Concepts

Experiences

Lesson Twenty-Two

Concept: There are three states of matter.

Lesson Twenty-Three

Concept: The smallest particle of a substance that has the characteristics of that substance is a molecule.

Lesson Twenty-Four

Concept: Man has learned to produce electricity which seems to flow in currents, therefore being called current electricity.

Lesson Twenty-Five

Concept: Electricity is the flow of electrons through conductors.

Lesson Twenty-Six

Concept: White light is a mixture of all frequencies in the spectrum we can see.

Lesson Twenty-Seven

Concept: Sound is a form of energy.

Lesson Twenty-Eight

Concept: Machines make work easier by increasing force, increasing the speed with which work is done, or by changing the direction of force.

Lesson Twenty-Nine

Concept: Mississippi provides a wonderful place for many plants and animals to live.

Lesson-Thirty

Concept: Evaluation is necessary to learn of the progress made during the years.

LESSON ONE

I. CONCEPT:

Some things are living and other things are non-living.

II. OBJECTIVES

A. To cause the student to develop an awareness for the things that are living and their characteristics as compared to the things that are not living.

B. To develop an appreciation for orderly arrangement in which both living things and non-living things are arranged.

C. To create a desire to learn more of the interesting things on this earth.

D. To help the student to understand how the many things are divided into groups of like characteristics to make the learning process easier.

III. PROBLEM:

To be able to distinguish the living from the non-living.

IV. MORE FUN

A. Books
1. The Wonder World of Animals, Marie Neurath
2. Exploring the Animal Kingdom, Millicent Selsam
3. Familiar Animals of North America, W. Barber

B. Films:
Living and Non-Living, Cor

C. Filmstrips
1. How Animals Are Grouped, YAF
2. Living Things, SVE
3. Learning About Living Things, EDF

UNIT ONE

ANIMALS

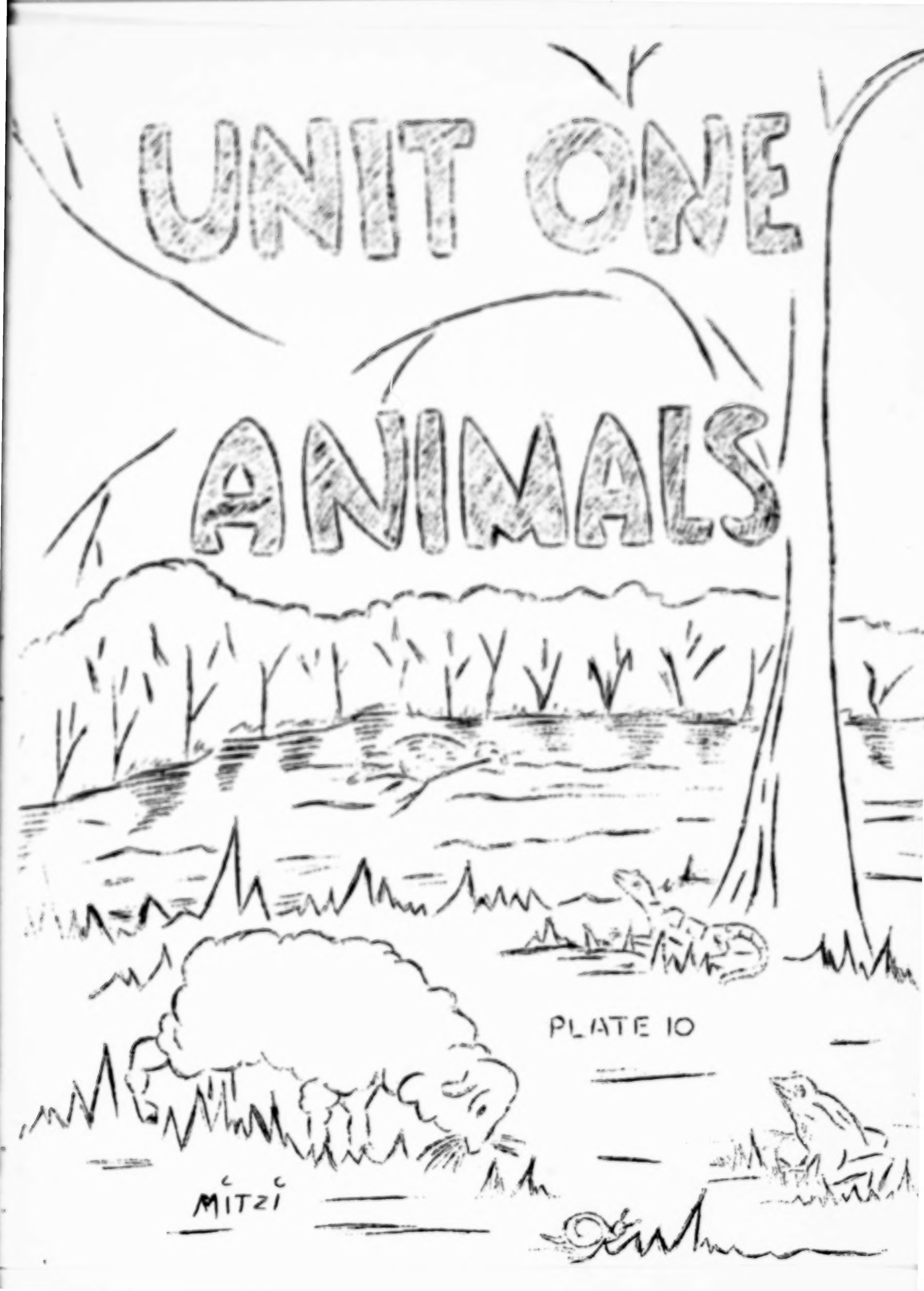

PLATE 10

UNIT ONE

LIVING-THINGS

ANIMALS

I

Introduction

There is a relationship of plants, animals and their environment. It is impossible to study any one of these without considering the other. Divisions into areas of study make it easier to organize the subject matter and simplify the learning process. A further division of the living things into two large groups divides it into plants and animals.

It is important that the children develop an awareness of the untold thousands of plants and animals that are present on this earth.

To further simplify the process of learning about the animals, they are divided into smaller groups that have like characteristics, then further divided until only one given animal is the subject of discussion. These animals are of many sizes, have varying appearances, and live in a wide variety of environments.

In this unit the principle of interrelationship of plants, animals, and their environment is dealt with in the last lesson of the unit. This correlates the study of animals with the following unit of study.

All animals are divided into two groups, the invertebrates and the vertebrates. Each of these large groups is further divided into smaller groups. Listed are the ten groups that have been considered for many years. Several lessons are developed around these smaller groupings, using one or more animal to represent the entire group. The study areas progress from the simpler animals to the more complex animals with the exception of the second lesson, studying the human being.

The study of the human body was undertaken at this time to encourage the student to be conscious of the care of his body so that he will develop good health habits.

These lessons add to the knowledge the students have acquired concerning the classification of animals, their characteristics and the relationship of the animals to their environment.

These lessons are a continuation of the study in the third and fourth grades of the ten divisions of the animal kingdom, encompassing their characteristics and relationship to their environment.

While classification is not a major purpose of the unit, children may be encouraged to observe certain characteristics that are typical of any one class. An opportunity is given to the students to acquaint themselves with the animal divisions and encounter many interesting experiences that will add to their knowledge of the study of animals.

II

Major Concepts

A. Animals are classified according to structure.

1. There are many kinds of animals in each area of study.
2. Animals are divided into two groups, invertebrates and vertebrates.
3. Some animals are small while others are large.
4. There are four groups of animals classified as arthropods.
5. There are five groups of animals that have backbones.
6. Man is classified as a mammal.

B. The framework of man supports the body.

1. Proper posture is important to the well being of the body.
2. Proper exercise keeps the body functioning better.
3. Proper care of the body must be maintained to have a healthy body.

C. Some insects live in groups and are called social insecta.

1. Insects are grouped together because of their like characteristics.
2. Insects have varied talents.
3. Insects have friends and enemies.
4. Some insects will build large homes for large groups of insects.
5. The daily life of the ant is organized.

D. There are more than 6500 kinds of worms.

1. Myriapods are animals with many jointed legs.
2. Worms could be thought of as flatworms, round, and segmented worms.

3. Some worms of the groups called round worms live in water and some live in the soil.

4. Most of the roundworms are harmless.

5. Some animals have no bones.

E. Amphibians are cold-blooded animals.

1. Mammals, amphibians, reptiles, and fish are vertebrates.

2. Amphibians spend part of their lives in the water and part on land.

3. Amphibians belong to the group of animals with backbones.

4. Sometime during the life of an amphibian they have gills.

F. Mammals are the most complex of the vertebrates.

1. Mammals are the most intelligent of all groups of animals.

2. Compared to sizes of their bodies, the brains of mammals are larger than those of any other animal group.

3. Mammals are found in almost all parts of the world.

4. Like all other living things, mammals are classified according to their structure.

G. Different environments create different plants and animals.

1. Plants and animals must adjust to their environment if they are to survive.

2. The location on the earth creates various environments.

III

Experiences

A. Lesson Two

1. Illustrate the correct way to stand and sit.

2. Show the students an illustration of the muscles of the body, pointing out the muscles that are used when the body is held erect.

3. Study the skeletal system of the body.

4. Have students list their five senses and the parts of their bodies that are involved in each.

5. Discuss exercises that will develop muscles and aid in good posture.

6. Permit the class to plan routine exercises and keep records to see how many exercises they do each day.

B. Lesson Three

1. Have students list ways in which insects can be helpful and harmful.

2. Discuss the life cycle of an insect from the egg stage to the adult stage. Show the class pictures or examples of each stage.

3. Bring in representatives of the different classes of insects and discuss their differences.

4. Have the pupils make a collection of insects.

5. Collect ants. Make an ant-watching station.

6. Make a list of insects that live alone and also one of insects that live in groups.

7. Prepare a bulletin board of all the insect engineers.

C. Lesson Four

1. Examine a myriapod under a magnifying glass. Distinguish between the centipede and the millipede.

2. Discuss some of the arthropods found in the sea that we eat.

3. Show the segments of the arthropod by pointing them out on the animal.

4. Have the students classify the animals on the basis of similarities.

D. Lesson Five

1. Have the students find out how the tapeworm gets into the intestine of a human being.

2. Dissect a worm and point out the different parts to the pupils.

3. Trichinosis is a disease of man caused by a parasitic roundworm. Study the cause of this disease.

E. Lesson Six

1. Obtain some tadpoles and raise them until they change to frogs.

2. Provide a frog or toad to be examined by the students. Make a list of questions to be answered.

3. Discuss the parts of the amphibian's body that makes it possible for it to live on land and on water.

F. Lesson Seven

1. Visit a zoo and observe the living habits of some strange mammals.

2. Visit a farm and observe the many mammals.

3. Observe the mammals you have in your classroom. Hamsters make good mammals for the classroom.

G. Lesson Eight

1. Prepare a bulletin board of the animals that could be included in the aquarium.

2. Prepare a bulletin board of the animals that could be included in the terrarium.

LESSON TWO

I. CONCEPT:

Bad posture is almost entirely due to improper muscle habits.

II. OBJECTIVES

A. To give the students an opportunity to learn proper exercises.

B. To cause the student to become aware of exercises that will benefit him.

C. To learn that certain exercises are necessary to correct certain improper habits.

D. To learn an admiration and respect for the body and it's care.

III. PROBLEM:

To learn specific exercises that will aid the student in his posture problem.

IV. MORE FUN

A. Books
1. How Your Body Works, Herman and Nina Schneider
2. What's Inside of Me, Herbert S. Zim
3. The Wonders Inside You, Margaret Cosgrove
4. All About the Human Body, Bernard Glemser
5. The Story of Your Circulation System, Leo Schneider
6. Through the Magnifying Glass, Julius Schwartz
7. Our Senses and How They Work, Herbert Zim
8. The Human Body, Cyril Bibby and Ian Morisco
9. Wonders of the Human Body, Anthony Ravelli

B. Films
1. Improving Your Posture, Mississippi State Board of Health
2. Learning About Our Bodies, EBF
3. Sitting Right, Associated Films
4. Your Posture, YAF

5. Heart, Lungs, and Circulation, Cor
6. Learning About Your Nose, EBF
7. You and the Living Machine, (Walt Disney) EBF
8. You and Your Five Senses, (Walt Disney) EBF

C. Filmstrips
1. Bones and Muscles, YAF
2. How Your Body Grows, Curr F
3. This is You, (Walt Disney) EBF
4. Posture and Muscles, SVE

LESSON THREE

I. CONCEPT:

Ants are one of the most highly developed species of the insect world.

II. OBJECTIVES

A. To cause an awareness that there are divisions even in the class insecta.

B. To give an opportunity for the student to learn that all the orders of the insects each have characteristics like other insects in that order.

C. To cause interest and create curiosity in the life history of insects.

D. To cause an awareness of the degree of development of some of the insects.

E. To show cause of economic importance of the insects.

III. PROBLEM:

To learn, from a representative insect, the degree of development of some of the insects.

IV. MORE FUN

A. Books

1. The Story of Ants, Dorothy Shuttleworth and Susan Swain
2. Insect Engineers, Rugh Bartlett
3. Animal Homes, George Mason
4. Insects and Their Ways, Bertha Morris Parker
5. An Ant Is Born, Harold Doering and Jo Mary McCormick
6. The How and Why Wonder Book of Ants and Bees, Ronald Rood
7. The Wonderworld of Ants, Wilfred Bronson
8. The World of Ants, G. Collons Wheat
9. Honeybee, Mary Adrian

B. Films
   1. Ant City, ALF
   2. Ants, EBF
   3. Animal Communities, Cor
   4. How Insects Help Us, Cor
   5. Dragons and Damsels, ALF
   6. Beetles, EBF
   7. Butterflies, EBF
   8. Insects Are Interesting, Densing Films Production

C. Filmstrips
   1. American Insect Guide, YAF
   2. Backyard Insects, SVE
   3. Controlling Insect Pests, Photo Lab.
   4. How Insects Live and Grow, SVE
   5. Insects and Their Ways, SVE

LESSON FOUR

I. CONCEPT:

There are four kinds of arthropods.

II. OBJECTIVES

A. To cause a clearer understanding of the classification of the arthropods.

B. To learn that the body of the arthropod is divided into segments.

C. To become aware of the fact that the skeleton of the arthropod is on the outside of its body and is made of a hard substance.

D. To understand that in order to grow the arthropod sheds its old skeleton and waits for a new one to grow.

E. To create an interest in the myriapods.

F. To cause the students to learn the characteristics of the myriapods.

G. To become aware of the concern of the myriapods to man.

H. Myriapods are animals with many jointed legs.

III. PROBLEM:

To create an interest and understanding of the animals with jointed legs.

IV. MORE FUN

A. Books:
The First Book of Bugs, Margaret Williamson

B. Films
1. Beetles, EBF
2. Putting Animals in Groups, International Film Bureau, Inc.

LESSON FIVE

I. CONCEPT:

Flatworms can exist in the livers of men and domestic animals, while others may live in the intestines. Those that are parasites do much harm.

II. OBJECTIVES

A. To cause the student to learn how common disease-causing worms are spread.

B. To emphasize clues to the control of the disease-causing worms.

C. To illustrate the similarities of the worms for easier studying.

D. To create an interest in the world of worms and their importance to our health.

E. To learn to group the worms for easier studying.

III. PROBLEM:

To cause the student to learn a representative life cycle of a worm so he may better be fitted to prevent infection.

IV. MORE FUN

A. Books
1. Garden Book of Biology, Rose Wyler
2. The Science of Life, Lois and Louis Darling

B. Films
1. Hookworm, Mississippi State Board of Health
2. Hookworm, Disease, Mississippi State Board of Health
3. Putting Animals in Groups, International Film Bureau

C. Filmstrips:
Living Things, SVE

LESSON SIX

I. CONCEPT:

Amphibians spend their early lives in water and much of their adult lives on land.

II. OBJECTIVES

A. To learn that there are several kinds of turtles.

B. To learn the animals that make up the group of amphibians.

C. To cause an awareness of the vast changes through which the amphibians go from babies to adults.

D. To cause a better understanding of the relationship of the members of the amphibian group to one another.

E. To cause a better understanding of the relationship of the members of the amphibians to the other vertebrates.

F. To learn the characteristics of the amphibians.

III. PROBLEM:

To create an interest in amphibians by giving the student an opportunity to study the life histories of representative groups of animals.

IV. MORE FUN

A. Books

1. Little Red Newt, Louise and Norman Harris
2. Tale of a Pond, Herny Kane
3. The Book of Reptiles and Amphibians, Micheal Bevans
4. Reptiles and Amphibians, Herbert Zim and M. Smith Hobart
5. Turtles, Wilfred Bronson
6. Turtles, Bertie Stewart and Gordon Burks
7. What Is a Frog?, Gene Darby
8. Frogs and Toads, Herbert Zim
9. Toads and Frogs, Bertha M. Parker
10. The Toad, Robert M. McClung

B. Films
   1. Amphibians, Cor
   2. The Frog, EBF
   3. Life in a Pond, NET
   4. More Ways Than One, NET
   5. Amphibians, Frogs, Toads, and Salamanders, FAC

C. Filmstrips
   1. Freshwater Shellfish and Amphibians, JH
   2. Freshwater Turtles and Fish, JH
   3. How Amphibians Get Their Food, Curr F
   4. Reptiles and Amphibians of the Tropical Forests, EBF
   5. Learning About Amphibians, EBF

LESSON SEVEN

I. CONCEPT:

Mammals have the most highly developed bodies of all animals.

II. OBJECTIVES

A. To learn the general characteristics of mammals.

B. To study one order as a division of the mammals.

C. To learn of the economic importance of the mammals.

D. To develop a wide knowledge of mammals.

E. To develop a curiosity and interest in the many orders of mammals.

F. To develop a thoughtful attitude concerning the care of many mammals.

III. PROBLEM:

To cause the student to learn facts about mammals from the study of a few examples.

IV. MORE FUN

A. Books

1. The First Book of Mammals, Margaret Williamson
2. The Great Whales, Herbert Zim
3. An Introduction to the Animal Kingdom, R. Will Burnett, Harvey Fisher, and Herbert Zim
4. Meet the Mammals, Lucy Keeling
5. Here Comes the Whales, Alice Goudy
6. Here Comes the Beavers, Alice Goudy
7. Elephants, Herbert Zim
8. Lone Muskrat, Glen Rounds
9. First Book of Tropical Mammals, Helen Hoke

D. Films
   1. The Bear and Its Relatives, Cor
   2. The Beaver, EBF
   3. Mammals of the Countryside, Cor
   4. Mammals of the Western Plains, Cor
   5. North American Elk, WF
   6. Mammals are Interesting, EBF

C. Filmstrips
   1. Mammal Set, SVE
   2. Learning About Mammals, EBF
   3. Age of Mammals, EBF

LESSON EIGHT
(Interrelated)

I. CONCEPT:

A saltwater aquarium in the classroom offers pupils variety of activities which lead to scientific learning.

II. OBJECTIVES

A. To bring the sea closer to the elementary classroom.

B. To present experience by which the students may learn by doing.

C. To create an interest and curiosity about sea life.

D. To emphasize that there is an interrelationship among plants and animals that is necessary for life to continue.

III. PROBLEM:

To gain knowledge of the sea by building a saltwater aquarium.

IV. MORE FUN

A. Books
1. A True Book of Tropical Fish, Ray Broedel
2. Wonders of the Seashore, Jacqueline Derrill
3. Beginner's Guide to Seashore Life, Leon Hausman
4. Life Along the Seashore, Alan Solem

B. Films
1. Beneath the Sea, TFC
2. The Sea, TFC

UNIT TWO
SPACE AND EARTH
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PLATE 11

UNIT TWO

NON-LIVING THINGS

SPACE AND EARTH

I

Introduction

We study the changes in the universe by first studying the familiar surroundings in our everyday life. We progress from the composition of the earth, solid, to contributing factors in the building up and tearing down of the earth, to the changes in the immediate surroundings of the earth. A pause is necessary for safety during the Christmas holidays; from hence, we go to a study of the heavens then back again to the waters of the earth. A program correlating the timings from the heavens and the biological timings is undertaken before the last program of the unit which emphasizes the animals and plants in relationship with a water environment. These programs are follow-up programs of the third and fourth grade subject matter.

The forces of building up and tearing down are at work even now, as they were early in the history of the earth.

Geologists have found ways of studying the interior of the earth, just as the astronomer has found ways of studying stars across space.

The tremendous force which pushes up on the crust of the earth is a result, in part, of heat caused by slow breakdown of radioactive elements in the earth's crust.

The great variety of elements in the earth are a treasure-house of materials for man's use. Sometimes they are exposed to the surface by various means.

As children arrive at the answers to why mountains are formed and broken down, how the land is built up, how fossils may be found in ancient sediments deep under rocks, children investigate the earth inside as well as outside. They gain an understanding of the variations of the rocks. They grow in appreciation of the rich variety of useful substances under their feet.

The earth has three parts; the land, the water, and the atmosphere. The atmosphere is just as real a part of the earth as the land we live on and the water we swim in. The forms of precipitation in the atmosphere cause changes on the earth.

Astronomers have studied the universe for many years. They know much about it. We will study some of the information about the universe. Some day you may be the one to discover "new things" in the universe.

We have seen how the land is broken down and built up. Now we go to the bottom of the ocean to see how it is broken down and built up.

It is necessary to have a special kind of ship, the bathyscaphe. From this,a view can be obtained of the ocean bottom. It is not a smooth, flat, surface. Like the land, the ocean bottom has mountains, valleys, and plains. Also, a strange sight is the kind of rain, which is a rain of materials falling through the water to the ocean bottom.

A relationship is brought out concerning the influence that the heavens have on the waters of the earth. This lesson, as well as the last one, is to cause an awareness of the relationship of plants animals and the universe.

II

Major Concepts

A. The earth's crust varies from three to twenty miles in depth.

1. Some changes of the earth are rapid while other changes are slow.

2. Rocks are constantly being broken down and are constantly being formed.

3. A mineral is any substance that occurs naturally in the earth's crust.

4. A rock is a hard substance found naturally in the earth's crust. It consists of different minerals.

5. The rocks in the earth's upper crust may be classified as igneous, sedimentary, or metamorphic.

6. Minerals can be identified by specific physical and chemical characteristics.

B. Forces are at work which build up the surface of the earth.

1. The slipping of the earth may be in a horizontal or sideways direction, or in a verticle or up and down direction.

2. No part of the earth is entirely free from earthquakes.

3. Ocean waves are often set up by earthquakes.

4. Changes in the earth tend to balance it.

C. The uneven heating of the surface of the earth causes the changes in weather.

1. Cold air moves away from the poles.

2. Warm air moves up and away from the equator.

3. Condensation takes place when the air is cooled below the dew point.

4. Evaporation is always taking place.

5. Different atmospheric conditions cause different clouds.

D. The law in the community is for the betterment of the community.

1. Age limits are considered in some laws.

2. Law officers are for the protection of the people.

E. It is difficult to think of the extent of the universe.

1. Some stars are seen for only part of the year.

2. Objects may appear to move in relation to one another if the position of the viewer changes.

3. Almost all of the stars you can see are in the Milky Way.

4. There are billions of galaxies in the universe.

5. The milky way is a spiral galaxy.

F. The ocean floor is uneven as the land above water.

1. The ocean floor is changing.

2. Instruments can measure the depth of the ocean.

3. The history of the earth can be studied by the changes taking place now.

4. The ocean contains untold wealth.

III

Experiences

A. Lesson Nine

1. Have the students make a list of the famous astronomers.

2. Look up the latest information concerning taking pictures in the sky from space stations.

3. Use a surveyor's transit to observe the stars.

4. Make a list of the instruments used to study space.

B. Lesson Ten

1. Watch a "Four O'Clock" and see what time it closes.

2. Make a chart of the time the ducks pass over on their way to the south.

3. Look around you for animal and plant clocks.

C. Lesson Eleven

1. The students can collect weather maps for several days and follow the highs and lows.

2. The students can make a pictorial representation showing various types of clouds.

3. Weather instruments may be used to help predict the weather.

D. Lesson Twelve

1. Secure the law concerning motor vehicles and emphasize the necessity of its observation.

2. Visit a police station.

3. Visit a jail.

E. Lesson Thirteen

1. Ask the students to bring in the rocks they have and classify them into the three groups.

2. Since quartz is common, the students might classify it by color.

3. Observe cuts in hillsides or road cuts to see the layers of earth.

4. Prepare crystals as a study of the formation of rocks.

5. Obtain samples of stones from a monument dealer. These materials will show the different colors and crystal sizes found in granite.

6. Test for limestone.

F. Lesson Fourteen

1. Ask some of the students to report on the project Mohole.

2. Experiment with small buildings built of various materials to see which will withstand the greater amount of shaking.

3. Plan a systematic method of studying the changes within the earth.

4. Experiment with different materials to see which will carry sounds from the earth the greater distance.

G. Lesson Fifteen

1. Draw a picture of the bottom of the ocean off our coast.

2. Ask for reports on the ocean as a great storehouse.

3. Find out the reasons for the deep places in the ocean.

H. Lesson Sixteen

1. Have students list plants and animals they might expect to find in and around a pond or swamp.

2. Collect pond water and observe the microscopic life in it.

LESSON NINE

I. CONCEPT:

The Milky Way is a huge system of stars, dust and gas.

II. OBJECTIVES

A. To better understand the meaning of the Milky Way.

B. To learn the location of the earth in the Milky Way.

C. To learn the meaning of galaxy.

D. To get some conception of the extent of the universe.

E. To become aware that there are many objects in the heavens.

III. PROBLEM:

To bring a clearer understanding of the universe.

IV. MORE FUN

A. Books
1. Point to the Stars, Joseph and Lippincott Joseph
2. The Adventure Book of the Stars, Thomas D. Nicholson
3. A Dipper Full of Stars, Lou Williams Page
4. Find the Constellations, H. A. Rey
5. Milky Way, Bart and Priscilla Bok
6. The Sun, Herbert S. Zim
7. Telescopes and Observatories, Patrick Moore

B. Films
1. Exploring the Night Sky, EBF
2. Solar System, Cor
3. The Sun's Family, YAF
4. What Do We See in the Sky, Cor
5. Beyond Our Solar Systems, EBF
6. Stars and Star Systems, EBF
7. Constellations, Guide to the Night Sky, Indiana University
8. The Milky Way, United World Films

C. Filmstrips

1. Astronomy, United World Films
2. The Sky, JH
3. The Starry Universe, Life
4. Multitude of Suns, JH
5. How We Learn About the Sky, JH
6. The Stars, EBF

2

LESSON TEN

I. CONCEPT:

There are many timekeepers of life.

II. OBJECTIVES

A. To become aware that there are many biological timekeepers.

B. To become aware of the timekeeping of the heavens.

C. To create interest in the many plants, animals and heavenly bodies that are timekeepers.

D. To cause an awareness that the many common things in our lives have many things about them that are interesting and many things yet to be learned.

III. PROBLEM:

To get information to the students to arouse their curiosity and interest enough to instigate personal experiences with their surroundings.

IV. MORE FUN

A. Books
1. The First Book of Time, Jeanne Benedict
2. Strange Travelers, Lavine Sigmund
3. Growing and Changing, Samuel Exler
4. Wake Up Farm, Alvin Tressler
5. Migration of Birds, Jean Dorst
6. Animal Navigation, J. D. Carthy
7. Dancing Bees, K. Frisch
8. Bird Migration, Donald Griffin
9. Migration of Butterflies, C. B. Williams
10. Leaper: The Story of the Atlantic Salmon, Robert McClung

B. Films
1. Autumn, ALF
2. The Seasons of the Year, Cor

3. Summer on the Farm, EBF
4. Autumn on the Farm, EBF
5. Winter on the Farm, EBF
6. Spring on the Farm, EBF
7. Animals in Winter, EBF
8. Birds in Winter, EBF
9. Flight of the Sea Birds, WLF

C. Filmstrips
1. Animals and Seasons, Curr F
2. The Migration of Birds, JH

LESSON ELEVEN

I. CONCEPT:

The ends of the earth are our weather factories, and their influence on the lands nearer the center is very pronounced.

II. OBJECTIVES

A. To call attention to the sky and the changes from day to day.

B. To provide the student with firsthand experiences with the weather.

C. To encourage cloud study.

D. To relate evaporation and condensation to the gain and loss of heat.

E. To introduce a study of the causes of differences in temperature on the earth.

F. To further study the types of precipitation in the atmosphere and the causes.

III. PROBLEM:

To give an opportunity for the students to learn by experience some of the information concerning the weather.

IV. MORE FUN

A. Books
1. The Adventure Book of Weather, Harry Milfrom
2. Everyday Weather and How It Works, Herman Schneider
3. Our Changing Weather, Carroll and Mildred Fenton
4. Probing the Atmosphere: The Story of Meteorology, Louise Wolfe
5. Snow, Thelma Harrington Bell
6. All About the Weather, Ivan R. Tannehill
7. Follow the Sunset, Herman and Nina Schneider

B. Films
1. Origin of Weather, Carousel
2. Weather, Understanding Precipitation, Cor

3. Air All About Us, Cor
4. Clouds, ALF
5. Water Cycle, EBF

C. Filmstrips
1. All Kinds of Weather, EGF
2. Water in Weather, Curr F
3. Weather and Life, EGF
4. Air and Its Properties, YAF
5. A Trip to the Weather Station, YAF
6. Clouds, Rain, and Snow, SVE

LESSON TWELVE

I. CONCEPT:

Laws must be learned and observed.

II. OBJECTIVES

A. To acquaint the students with the need for knowing the laws and obeying them.

B. To cause the student to become aware that the law is for his good.

C. To create a friendly feeling toward the law officers.

D. To create a desire in the students to be a law abiding citizen.

III. PROBLEM:

To get the students to become aware of the necessity of knowing the law and obeying it.

IV. MORE FUN

A. Books:
Watch Your Step, J. J. Foherty

B. Films
Fire, EBF

LESSON THIRTEEN

I. CONCEPT:

Rocks are grouped according to the ways in which they were formed.

II. OBJECTIVES

A. To learn of the formation of the igneous rocks.

B. To learn of the formation of the sedimentary rocks.

C. To learn of the formation of the metamorphic rocks.

D. To give examples of the various rocks.

E. To correlate given rocks to our area.

F. To create an interest in the earth surrounding us.

G. To search out the economic importance of the rocks of the earth.

III. PROBLEM:

To cause an understanding of the basic kinds of rocks and the conditions present for their formation.

IV. MORE FUN

A. Books

1. The Earth's Crust, Irving and Ruth Adler
2. The Earth's Story, Gerald Ames
3. Volcanoes, Walter Beuhr
4. Wonders of Geology, Henry Collins
5. Great Mysteries of the Earth, Charles Hapgood
6. Rocks and Minerals, Herbert Zim
7. Rocks and the World Around You, Elizabeth Clemons
8. Riches From the Earth, Carroll and Mildred Fenton
9. My Hobby Is Collecting Rocks and Minerals, David Jensen
10. The Story of Rocks, Dorothy Shuttleworth
11. Rocks and Minerals and the Stories They Tell, Robert Irvin

B. Films
   1. What Makes Day and Night?, Diard
   2. Minerals and Rocks, EBF
   3. Understanding Our Earth: How Its Surface Changes, Cor
   4. Understanding Our Earth: Rocks and Minerals, Cor

C. Filmstrips
   1. Face of the Land, Life Magazine
   2. How Rocks Are Formed, JH
   3. The Soil, JH
   4. About Our Earth, Curr F
   5. How Our Earth Began, Curr F

LESSON FOURTEEN

I. CONCEPT:

A sudden movement of part of the crust of the earth is called an earthquake.

II. OBJECTIVES

A. To learn some of the causes of the shifting of the earth.

B. To learn about instruments that have been developed to predict earth movements.

C. To learn of the large shifts of the earth in times past.

D. To become aware of the relationship of waves to the shifting of the earth.

E. To learn methods of better studying the changes in the earth.

III. PROBLEM:

To cause the student to accumulate a knowledge of the changes which go on in the earth.

IV. MORE FUN

A. Books
1. Mountains on the Move, Marie Bloch
2. The First Book of Volcanoes and Earthquakes, Rebecca Marcus
3. Why the Mohole?, William Cromie
4. The Earth, Laurence Hubbell
5. The Mountains, Lorus and Margery Milne
6. Elements of Geology, James Zumberg
7. All About Volcanoes and Earthquakes, Frederick Pough

B. Films
1. How Our Earth Began, EBF
2. Understanding Our Earth, Cor
3. The Face of the Earth, EBF

C. Filmstrips
1. The Story of Volcanoes, EBF
2. Our Changing Earth, JH

LESSON FIFTEEN

I. CONCEPT:

The surface of the earth beneath the oceans is not flat.

II. OBJECTIVES

A. To cause an awareness that the surface of the earth under the water is constantly changing.

B. To learn about the earth's past by studying about the changes that are occuring in the present.

C. To learn causes for the constant changes in the earth's surface.

D. To learn that some changes in the earth's surface are to balance each other.

E. To learn that the contour of the ocean floor resembles that of land not covered by water.

F. To come to realize that the plants, animals, and mineral riches of the water part of the earth are still largely untapped.

III. PROBLEM:

To cause an interest and understanding in the great wealth of information that the oceans hold.

IV. MORE FUN

A. Books
1. What Happens in the Sea, Ray Bethers
2. All About the Sea, Ferdinand Lane
3. Sea and Shore, Clarance Hylander
4. The Illustrated Book of the Sea, Leon Hausman and Felix Sutton
5. The Wonderful World of the Sea, James Fisher

B. Films
1. Pirates of the Deep, Bray
2. Beneath the Sea, TFC
3. Life in the Sea, EBF

LESSON SIXTEEN
(Interrelated)

I. CONCEPT:

There is a web of life in a pond or swamp.

II. OBJECTIVES

A. To learn how to explore a pond.

B. To learn of the life around a pond (animals and plants).

C. To learn to catch some animals in or near the water to study.

D. To observe pond animals.

E. To collect pond plants to study.

III. PROBLEM:

To interest the students in the wide area of study a pond furnishes.

IV. MORE FUN

A. Books
1. Swamp Life, Glen Rounds
2. Let's Go To the Brook, Harriet Huntington
3. Pets From the Pond, Margaret Buck
4. Green Darner, The Story of a Dragonfly, Robert McClung
5. Snails, Dorothy Hogner

B. Films
1. Life Along the Waterways, EBF
2. Amphibians, Cor
3. Life in a Pond, NET

C. Filmstrips
1. Life in Ponds, Lakes, and Streams, JH
2. How Amphibians Get Their Food, Curr F
3. How Animals Live in Fresh Water, Curr F

UNIT THREE

PLANTS

PLATE 12

UNIT THREE

LIVING - THINGS

PLANTS

I

Introduction

Plants are found all over the world. They are found growing in all types of environments. There are few places where plants do not grow. Plants that live in the different environments are different. You would not expect to find tree like plants growing under water. A plant that is able to live on minute amounts of water would have roots different from those of plants that live in the soil with ample supply of water. Some plants are one cell, others are made of millions of cells. In the higher plants the cells form roots, stems, and leaves.

Most of the plants will be familiar to you. They range from the plants with no color or true roots, stems or leaves to those with true roots, stems, leaves, and flowers. Every part carries on some activity that enables the plant to live. Many of the parts are used by man for food, in making drugs, and as a raw material for building and manufacturing.

In this unit we will study many of the different plants, beginning with the first group of plants, fungi, the simplest

non-green plants, and going to the third group, which includes the ferns, then the fourth group to study the evergreens with naked seeds born in cones. The second group of plants was studied in the fourth grade. The specific part of the plant, the leaf, is studied as a follow up of the study previously of the stem and root. This plant study is concluded by studying the relationship of plants to plants and plants to animals.

II

Major Concepts

A. Fungi, the simplest group of plants, depend on other living things for food.

1. Fungi have no roots, stems, leaves, seeds, or flowers.

2. Molds, rusts, bacteria, and mushrooms are fungi.

3. Bacteria are one-celled fungi.

4. Yeast plants reproduce by budding.

5. Molds and mushrooms reproduce by spores.

6. Algea are the simplest group of plants that produce their own food,

B. Ferns are very common plants.

1. Mosses can make their own food.

2. Ferns have real roots, stems, and leaves.

3. Millions of years ago many regions of the earth were covered with large ferns.

4. Fossils of ferns are often found in coal.

5. Ferns reproduce by means of spores.

6. Ferns make their own food because they have cholorphyll.

C. The plants called conifers, include pine, cedar, and spruce trees.

1. Conifers are evergreens.

2. Conifers are valuable for lumber.

3. Our Christmas trees are of the conifer group.

D. Green plants capture of radiant energy for use in making food is basic for growth and maintenance of all living things.

1. Living things are interrelated with one another and their environment.

2. In the manufacture of carbohydrates during photosynthesis, green plants produce oxygen.

3. Animals depend upon the oxygen plants give off during photosynthesis.

4. Every living thing depends upon a continuous supply of oxygen.

5. Simple sugars and starches are manufactured during photosynthesis.

6. Green plants are the only thing that can directly trap and store energy of sunlight.

7. Light is essential for carbohydrate production in cells in a green leaf.

8. Plants are a source of our food substances directly or indirectly.

9. The arrangement of leaves generally enables them to receive the maximal amount of radiation.

E. There are many relationships between plants and animals

1. Partnerships of organisms are not always of mutual benefit.

2. Partnerships of organisms sometimes are of more benefit to one partner than to the other partner.

III

Experiences

A. Lesson Seventeen

1. Experiment with mold to find the best conditions for its growth.

2. Observe mold under a microscope.

3. Collect spores from mushrooms by removing the stem and suspending the cap over paper covered with glue. Observe through a microscope.

4. Warn everyone against eating any mushrooms they might pick.

5. Examine the green scum off the side of the acquarium.

6. Observe the spores with a magnifying glass.

7. Grow a mold garden.

B. Lesson Eighteen

1. Plant ferns that are found in the woods in boxes for classroom observation.

2. Make a permanent collection of various fern leaves by pressing the leaves between two sheets of wax paper with a warm iron.

C. Lesson Nineteen

1. On a field trip count all the different conifers you can find

2. Have students bring in as many different cones as they can find.

3. Make a list of the products of the cone bearing trees.

D. Lesson Twenty

1. Study the plants in your acquarium to see if they give off a gas all the time when in sunlight. Set up an experiment.

2. Study the plants in your acquarium when no sunlight reaches them, and observe the rate at which they give off sunlight.

3. Put covers over parts of leaves to exclude the sunlight. Observe if they manufacture food under the cover.

4. Seal a water plant in a jar; provide it with small amount of sunlight. Observe. Predict how long it will live. Experiment to find out.

E. Lession Twenty-One

1. Display partnerships in the classroom.

2. Take a field trip to discover the many partnerships.

LESSON SEVENTEEN

I. CONCEPT:

Fungi, the simplest group of plants depend on other things for food.

II. OBJECTIVES:

A. To learn about the simplest plants

B. To learn the life history of the colorless plants.

C. To compare the colorless plants with the other simplest plants, the algae.

D. To cause an awareness of the differences in these plants and the more familiar plants

E. To learn of the economic importance of the plants.

F. To create an interest in the plants that might go unnoticed

III. PROBLEM:

To learn how the simplest plants get their food.

IV. MORE FUN

A. Books
1. The First Book of Plants, Alice Dickerson
2. The Wonders of Algea, Lucy Kavaler
3. Our Tiny Servants: Mold and Yeast, Bernice Kohn
4. The Microscope and a Hidden World to Explore, Irene Pyszkowski
5. Plants of Woodland and Wayside, Su Zan Noguchi Awain

B. Films
1. Simple Plants: Bacteria, Coronet
2. Simple Plants: Algea & Fungi, Coronet
3. Life in A Cubic Foot of Air, Coronet
4. Mold and Yeast, EBF
5. Fungus Plants, EBF

6. Life Story of a Watermold, Phase Films
7. Miracle From Mold, Sterling
8. Pin Mold, International Film Bureau
9. Miracle of the Meadows, Baily

C. Filmstrips
1. Dependent Plants, SVE
2. Mushrooms, SVE
3. Finding out How Plants Grow, SVE

LESSON EIGHTEEN

I. CONCEPT:

Mosses and ferns are more complex than the fungi.

II. OBJECTIVES:

A. To show the advancement of the ferns over the fungi.

B. To illustrate that ferns were on the earth millions of years ago.

C. To give an opportunity to learn the representative life history of the fern.

D. To create interest in plants.

E. To show the economic importance of the ferns.

III. PROBLEM:

To cause an understanding of the complexity of the ferns over the simpler plants.

IV. MORE FUN:

A. Books
1. The Story of Mosses, Ferns, and Mushrooms, Dorothy Sterling
2. The First Book of Plants, Alice Dickerson
3. The Plant World, Bertha Morris Parker
4. Dependent Plants, Bertha Morris Parker

B. Filmstrips
1. Finding Out How Plants Grow, SVE
2. Roll Call of Plants, McGraw-Hill

LESSON NINETEEN

I. CONCEPT:

Conifers are plants that produce seeds that grow in cones.

II. OBJECTIVES:

A. To cause the student to understand the complexity of the seed plants over the fungi, mosses, and ferns.

B. To cause an awareness of the difference in the plants that bear seeds in cones and the ones that produce seeds along with flowers.

C. To relate trees of today as relatives of ancient trees.

D. To cause an understanding of the economic importance of trees.

E. To create curiosity about the trees that belong to the cone bearers.

III. PROBLEM:

To show the advanced development of the conifers over the simpler plants.

IV. MORE FUN:

A. Books
1. Trees and How They Grow, Katherine Carter
2. The Wonders of Seeds, Alfred Stefferud
3. See Through The Forest, Millicent E. Selsam
4. Plants Around the Year, Glenn O. Blough
5. Plant Factories, Bertha Morris Parker

B. Films
1. Photosynthesis, McGraw-Hill
2. Life of a Plant, EBF

C. Filmstrips
   1. Green Plants, Eyegate
   2. How a Plant Makes Food, McGraw-Hill

LESSON TWENTY

I. CONCEPT:

Green plants perform special functions without which life could not go on.

II. OBJECTIVES:

A. To clarify the process by which plants with chlorophyll make food.

B. To emphasize the importance of leaves.

C. To learn the parts of leaves and their function.

D. To learn to use a magnifying glass to study small objects.

E. To refresh the minds concerning cells and their function.

F. To create curiosity and interest in the functions of the leaves.

III. PROBLEM:

To cause an understanding of the processes that go on in a green leaf in the presence of sunlight.

IV. MORE FUN:

A. Books
1. Plants in the City, Herman and Nina Schnieder
2. This Green World, Rutherford Platt
3. Plants: A Guide to Plant Hobbies, Herbert S. Zim
4. Leaves, Bertha Morris Parker
5. My Garden Grows, Glenn O. Blough and Aldren Watson
6. Play With Leaves and Flowers, Millicent E. Selsam
7. Plants That Feed Us: The Story of Grains and Vegetables, Carrol L. Fenton and Hermin B. Kitchen

B. FILMS
1. The Cell-Structural Unit of Life, Cor
2. Learning About Leaves, EBF
3. Life of Plants, United World Films, Inc.
4. Wonders of Plant Growth, Churchill-Wexler
5. Garden Plants and How They Grow, Cor
6. Life From the Sun, International Films

C. FILMSTRIPS
1. How a Plant Makes Food, McGraw-Hill
2. Plant Factories, SVE

LESSON TWENTY-ONE

I. CONCEPT:

Partnerships are for the good of each partner.

II: OBJECTIVES

A. To study individual plant partnerships.

B. To study individual animal partnerships.

C. To study animal and plant partnerships.

D. To create interest in and understanding of plants and animals.

E. To cause an awareness of the need to share if greater benefits are to be received.

III. PROBLEM

To cause an awareness that plants and animals may or may not benefit from mutual association.

IV. MORE FUN

A. BOOKS
1. The First Book of Plants, Alice Dickerson
2. Plant and Animal Partnerships, Bertha Morris Parker
3. Strange Plants and Their Ways, Ross E. Hutchins
4. Wildlife Teams, Natalie Friendly
5. Walt Disney's Nature Half Acre, Jane Werner Watson

B. FILMS
1. Hookworm, Mississippi State Health Department
2. Pond: Animal and Plant Relationships, YAF
3. Partnership Among Plants and Animals, Coronet

UNIT FOUR

MATTER, ENERGY, AND MACHINES

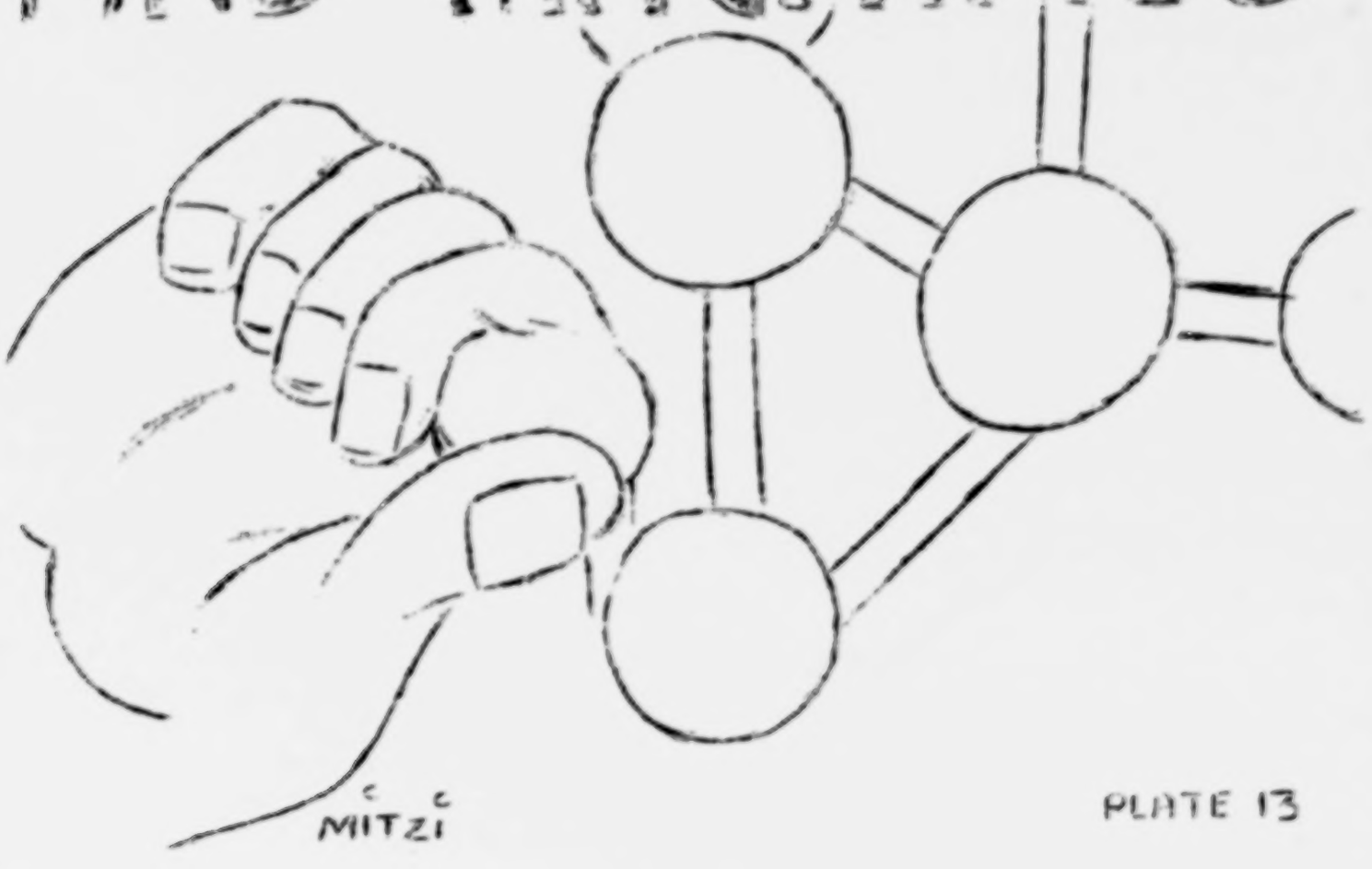

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PLATE 13

UNIT FOUR

MATTER, ENERGY, MACHINES

I

Introduction

In the previous years we explored the matter that everything is made of atoms and molecules. This unit will further this study by considering the effects that heat brings about when put into or taken from a substance. It gives a good understanding of the action of molecules at various temperatures.

There are times when the addition of heat will cause other changes than from one state to another. With this information we are ready to understand the difference between physical and chemical change. The emphasis is upon the chemical reaction brought about by the release or absorption of energy, and the changes in which no chemical reaction takes place. This builds an understanding of the fact that the changes we observe are physical or chemical changes.

A study is developed for an understanding of the flow of an electrical current. Emphasis is placed upon the electrons, conductors and the action on the part of a dry cell and a storage battery when they release energy and cause a current to flow.

Other forms of energy studied are light and sound. With a background of information obtained in the third and fourth grades, we study the light with the receiver the eye and the brain in mind, while with the sound the ear and the brain are considered.

A study of machines follows the study of energy because machines must have energy before they function. A more detailed study of the function of certain simple machines is undertaken. A considerable background in information about machines is necessary to grasp the full significance of complex machines.

As we end the study of the year we turn to things that are dear to all of us, our Mississippi. The study of our surroundings will enhance our understanding, love, and interest in our State.

An evaluation of our work concludes the work for the year.

II

Major Concepts

A. Matter exists in three states; solids, liquids, and gases.

1. Heat or lack of heat causes the changes in the states of matter.

2. The pull of molecules in solids is so strong that they are held together.

3. Molecules roll and slide over each other when matter is in a liquid state.

4. Molecules of a gas get as far apart as the container will permit.

5. Each state of matter has characteristics that separate it from other states of matter.

B. The earth's matter is built up of atoms combined in many ways.

1. A molecule is the smallest substance that retains the properties of the substance.

2. An element is made up of one kind of atom, with certain properties.

3. Compounds can be broken down into elements of which they are composed.

4. Compounds are built up from elements.

5. Compounds may be grouped by their chemical properties.

6. Chemical reactions are a dependable means of testing substances.

C. Current electricity flows through wire.

1. Electricity flows easily through conductors and not through nonconductors or insulators.

2. There has to be a complete circuit before electricity will flow.

3. If a part of the circuit is broken the current will not flow.

4. When too much current flows through a house, the fuse or circuit breaker acts as a safety device.

D. Electricity is the moving of electrons.

1. An electric cell generates electricity.

2. An electric cell is composed of two unlike materials and a chemical that reacts with them.

3. Most metals and graphites are good conductors, while most other materials are nonconductors or poor conductors.

4. Electricity can be turned off and on by an electrical switch.

5. A fuse breaks a circuit when too much electric power flows through the circuit.

6. A diagram can show the path that electrons travel in an electric circuit.

E. Machines can be used to change energy from one form to another.

1. The same amount of energy that a machine puts out must be put into the machine.

2. The energy (work) put into a machine is more than the work (energy) from a machine, excluding friction.

3. Energy cannot be created nor destroyed: it can be changed from one form to another without loss, excluding friction.

F. Light energy makes up only a narrow band of frequencies in the electromagnetic spectrum.

1. Mirrors collect light.

2. Light can be brought to a focus and magnified by lens.

3. Light is broken into a spectrum of colors as it passes through a prism.

4. Lenses and prisms can change the direction of light.

5. Part of the light spectrum is invisible.

6. The behavior of light may be explained as the movement of waves through space.

7. Your eyes act as windows to allow the light to enter and stimulate the nerve endings.

8. Brainwork is necessary for you to see.

9. Seeing is not always believing.

G. No matter where we may be, we usually can hear sound.

1. Sounds differ, depending upon the characteristics of the sound waves.

2. Man uses and controls sound waves in many ways.

3. The ears receive the sound waves.

4. Brainwork is necessary for you to hear.

5. Sound waves move through all forms of matter.

6. Sound waves do not travel through a vacum.

7. The rate at which a body vibrates is affected by the length, breadth, and type of material.

H. Mississippi offers many opportunities.

1. Many animals have adapted to living in Mississippi.

2. Many plants are adapted to living in Mississippi.

3. Many industries have developed in Mississippi.

4. The climate in Mississippi is conductive to year around activities.

5. Mississippi has many advantages over other states.

I. All science is interrelated.

III

Experiences

A. Lesson Twenty-Two

1. Examine the expansion joints on bridges.

2. Examine the expansion points on sidewalks.

3. Illustrate by using "dry ice" to show what happens when it is placed in a warm place.

4. Place alcohol in your hands. Explain the reason they feel cold.

5. Illustrate the differences in expansion by heating a bimetal strip.

6. Explain the reason that clothes dry at different rates during different seasons of the year.

7. Illustrate how dirty water can be separated from the trash by changing the state of the water to vapor and back again to water.

8. Fill a container with hot water. Observe the amount of water when it becomes cold.(Place in refrigerator).

9. Find the temperature that different materials change states.

10. Place a small amount of sawdust in water. Heat the water while observing the movement of the particles as the heat increases.

11. Display the three states of matter.

B Lesson Twenty-Three

1. Show the class Marcuric Oxide. Explain that it is a compound composed of mercury and oxygen.

2. Show the class the metal mercury.

3. Burn a piece of paper to illustrate a chemical reaction.

4. Place a few drops of bleach on colored cloth. Observe the chemical reaction.

5. Bring about a chemical change by adding vinegar to soda. Carbon dioxide was the chemical produced that is a gas.

6. Mix baking powder, water and flour. Heat and observe the dough becoming puffy. Explain.

7. Place a nail in water. Observe and explain the chemical action.

C. Lesson Twenty-Four

1. Have the students list all the things in their homes that use an electrical current.

2. Make a display of good conductors.

3. Make a display of poor conductors.

4. Have the pupils draw a diagram showing the complete circuits in their homes. This should show the place where the current enters and leaves the house as well as the fuses.

5. Ask the students to bring different size fuses to school to show.

6. Demonstrate a series and a parallel circuit.

D. Lesson Twenty-Five

1. Discuss how frayed wires can cause harm.

2. Let the students examine some burned out fuses.

3. Take apart a dry cell and examine.

4. Have the students bring battery operated toys to school.

5. Sometimes a flashlight will not operate. What are the three most likely causes?

6. Sometimes electrical appliances make a humming sound. Can you explain this?

7. The elements (or filaments) in an electrical oven, heating pad, or electric light get hot. Which gets the hottest? Why doesn't the wiring to these appliances get hot?

E. Lesson Twenty-Six

1. Have the children experiment with mirrors to illustrate that they collect light.

2. Show that water reflects better if it has a smooth surface rather than a rough surface. (ripples).

3. When it snows place different colored pieces of cloth on the snow and observe the different rates at which the snow melts underneath each.

F. Lesson Twenty-Seven

1. Find out through which media sound will travel best; solid, liquid, or gas.

2. Demonstrate vibrating bodies of different materials, different lengths, and different thicknesses.

3. Visit your nearest telephone company.

4. Ask a student to bring a string instrument to school and play it.

G. Lesson Twenty-Eight

1. Ask the students to search their homes for as many examples of the three classes of levers as they can find.

2. Demonstrate the property of a machine to change the speed at which work can be done.

3. Ask the students to prepare a bulletin board display that illustrates the importance of machines in our lives.

H. Lesson Twenty-Nine

1. Ask the students to look for the beauty in his surroundings.

2. List the number of animals that one can see in Mississippi.

3. List the plants that one can see in Mississippi.

4. List the industries of Mississippi.

5. List the advantages of our climate.

6. List the recreation available in Mississippi.

I. Lesson Thirty

1. Evaluate the work for the year by displaying materials made or collected.

2. Ask the students to prepare illustrations to explain their favorite subject during the year.

LESSON TWENTY-TWO

I. CONCEPT

Matter changes from one form to another

II. OBJECTIVE

A. To learn that all matter exists as solids, liquids, and gases.

B. To become aware that all matter is made of molecules.

C. To become aware that the molecules of matter are always moving.

D. To learn that the state in which any substance is found depends on how the molecules of that substance are moving.

III. PROBLEM

To cause an understanding that the amount of heat in a substance determines the state of the substance.

IV. MORE FUN

A. Books
1. All About the Wonders of Chemistry, Ira Freeman
2. Exploring Chemistry, Roy Gallant
3. Chemistry Creates a New World, Jaffe Bernard
4. Picture Book of Chemistry, Jerome S. Meyer
5. First Chemistry Book for Boys and Girls, Alfred Morgan
6. Its Fun To Know Why, Julius Schwartz

B. Films
1. Simple Changes in Matter, YAF
2. Simple Changes in Matter, Coronet
3. Wonders of Chemistry, YAF
4. Solids, Liquids, and Gases, YAF

C. Filmstrips

1. All Matter Has Three Forms, YLF
2. How Heat Is Transferred, YAF
3. How Heat Travels, Popular Science
4. Everything changes, Charles Scribner Sons
5. How Things In The World Change, Popular Science
6. Changes All Around Us, Popular Science

LESSON TWENTY-THREE

I. CONCEPT

The smallest particle of a substance that has the characteristics of that substance is a molecule.

II. OBJECTIVES

A. To provide further study of the nature and composition of matter.

B. To explain how the various elements combine to form new compounds.

C. To cause an understanding that a chemical change may involve the decomposition, or "splitting apart" of compounds into elements, as well as the putting together of compounds from elements.

D. To see the differences in molecules.

III. PROBLEM

To cause a clearer understanding of the properties of molecules.

IV. MORE FUN

A. Books
1. Building Blocks of the Universe, Isaac Asimov
2. The Chemical History of a Candle, Michael Faraday
3. Our Friend the Atom, Heinz Haber
4. Molecules Today and Tomorrow, Margaret Hyde
5. The Peaceful Atom, Bernice Kahn
6. The Story of Chemistry, Ira and Mae Freeman
7. The Story of the Atom, Ira and Mae Freeman
8. Exploring Chemistry, Roy Gallant
9. Atoms and Molecules, Seymour Trieger

B. Films
1. Man in the Doorway, Cyanamid
2. Chemical Change, McGraw-Hill
3. Chemistry Filmset, Coronet

4. Explaining Matter, EBF
5. Choose Chemistry, Bailey

C. Filmstrips
1. Atoms and Molecules, SVE
2. Atoms and Their Energy, FH
3. Science at Work, EBF
4. What Things Are Made Of, SVE
5. Chemical Cabbage, SVE
6. Atoms and Molecules, SVE

LESSON TWENTY-FOUR

I. CONCEPT:

Man has learned to produce electricity which seems to flow in currents, therefore being called current electricity.

II. OBJECTIVES

A. To recall knowledge on frictional electricity.

B. To develop an understanding of the flow of an electrical current.

C. To become familiar with the electron theory of matter.

D. To learn why some materials are good conductors.

E. To learn why some materials are good insulators

F. To develop an awareness for the need to follow rules of safety.

G. To cause a realization of the economic importance of electricity.

H. To create an interest in current electricity.

III. PROBLEM:

To create a clear picture of the electron in motion.

IV. MORE FUN

A. Books

1. Experiments with Electricity, Nelson F. Beeler and Franklyn M. Branley
2. The First Book of Electricity, Sam and Beryl Epstein
3. All About Electricity, Ira M. Freeman
4. Picture Book of Electricity, Jerome S. Meyer
5. The First Electrical Book for Boys, Alfred P.Morgan
6. Lets Find Out About Electricity, Herman and Nina Schneider

7. Lightning and Thunder, Herbert S. Zim
8. Electricity, Bertha Morris Parker
9. Electricity, Arnold Mandelbaum
10. I know a Magic House, Julius Schwartz

B. Films
1. Frictional Electricity, YAF
2. Using Electricity Safely, McGraw-Hill
3. Flow of Electricity, YAF
4. Introduction to Electricity, Coronet
5. Story of Electricity, Knowledge Builders
6. Electricity All About Us, Coronet
7. Flow of Electricity Current, EBF
8. Learning About Electrical Current, EBF

C. Filmstrips
1. Electricity, YAF
2. Frictional Electricity, EBF
3. Light in Our Daily Lives, EBF
4. The Wonder of the Electric Light, EBF
5. Electricity, SVE
6. Fundamentals of Electricity, Photo Lab.

LESSON TWENTY-FIVE

I. CONCEPT:

Electricity is the flow of electrons through conductors.

This can be caused by chemical reaction (batteries) or by magnetism (generation). Electricity is utilized by conducting a current through circuits to coils creating electromagnets (power) or through special type or resistance wiring creating heat (heat and light).

Introduction: To understand the production and flow of electric currents, an elementary understanding of the electron theory will be helpful. With this understanding, the student is more ready to understand the nature of voltage, currents, conduction and electrical usage.

II. OBJECTIVES

A. To understand the chemical reaction of the battery in producing electricity.

B. To review the principles involved in generating electricity.

C. To understand direct current and alternating current and how they are produced and used.

D. To understand simple circuits.

E. To understand the principles of producing power, heat and light with electricity.

III. PROBLEM

To bring about a better understanding of the production of an electrical current.

IV. MORE FUN

A. Books

1. All About Electricity, Ira M. Freeman
2. Ben Franklin-Scientist, Frank X. Ross
3. Lets Look Inside Your House, Herman and Nina Schnieder
4. A Boy and a Battery, Raymond F. Yates
5. The Story of Electricity, Mae Blacker and Ira M. Freeman
6. Electronics for Young People, Jeanne Benedick
7. There's Adventure in Electronics, Julian May
8. Boys First Book of Radio and Electronics, Alfred P. Morgan

B. Films

1. Electricity-How to Make a Circuit, EBF
2. Electricity, EBF
3. Electricity, YAF
4. Electricity At Home, Scribner
5. Electricity in Communication, Curr
6. Making Electricity, EBF

C. Filmstrips

1. Water Power Produces Electricity, PDP
2. Wonder of the Electric Light, EBF
3. Electricity, EBF
4. Electricity At Home, Scribner
5. Electricity Does It For You, McGraw-Hill
6. Primary Cell, Knowledge Builders

LESSON TWENTY-SIX

I. CONCEPT:

White Light is a mixture of all frequencies in the spectrum we can see.

II. OBJECTIVES

A. To cause a review of the characteristics of light.

B. To continue the study of reflections.

C. To emphasize the function of the eye in relationship to the light stimuli.

D. To cause an awareness of the importance of brainwork in seeing.

III. PROBLEM

To correlate light waves, the eye, and the brain.

IV. MORE FUN

A. Books
1. Color in Your Life, Irvin Adler
2. Experiments in Optical Illusions, Nelson F. Beeler and Franklyn M. Branley
3. The First Book of Light, George R. Harrison
4. Fun With Your Camera, Nae and Ira Freeman
5. The Wonders of Light, Hy Ruchilis
6. Light and Color, Frederick Healey
7. Our Wonderful Eyes, John Perry
8. Prisms and Lenses, Jerome S. Meyer

B. Films
1. All About Light, Cenco
2. Basic Physical Science: How to Bend Light, EBF
3. Light and Heat, Gateway
4. Light All Around Us, EBF
5. How to Bend Light, EBF
6. Light and Color, EBF

C. Filmstrips
1. How Light Can Be Bent, FH
2. How Light Helps Us, FH
3. Light, YAF
4. Light and How It Travels, JH
5. Light and Color, JH

LESSON TWENTY-SEVEN

I. CONCEPT:

Sound is a form of energy.

II. OBJECTIVES

A. To review the characteristics of sound.

B. To understand that different sound waves have different characteristics.

C. To review the structure of the ear and the function of the parts.

D. To emphasize the function of the ear in relationship to the sound stimuli.

E. To cause an awareness of the importance of brainwork in hearing.

F. To cause the student to learn that man can use and control sound waves.

III. PROBLEM

To correlate sound waves, the ear, and the brain.

IV. MORE FUN

A. Books

1. Sound, An Experiment Book, Irvin Adler
2. The Story of Sound, James Garalton
3. Story of Sound, G. J. Holton
4. Sound and Ultrasonics, Robert Irvin
5. Singing Strings, Larry Kettlekamp
6. Horns, Strings, and Harmony, Arthur H. Benade
7. Echoes of Bats, Donald R. Griffin
8. Sound, An Experiment Book, Marion E. Bear
9. Timmy and the Tin Can Telephone, Franklyn M. Branley and Eleanor K. Vaugh
10. Sounds All Around, Joseph Levine and Tillie Pine

B. Films
   1. Learning About Sound, EBF
   2. The Cause and Nature of Sound, JH
   3. You and Your Ear, EBF
   4. How Sound Travels, JH
   5. Sound Around, Eye Gate
   6. Exploring Sound, YAF
   7. What is Sound, YAF

C. Filmstrips
   1. Sound, EBF
   2. Sound, Visual Science
   3. Exploring Sound, Yaf
   4. You and Your Ears, EBF (Disney)

LESSION TWENTY-EIGHT

I. CONCEPT:

Machines make work easier by increasing force, increasing the speed with which work is done, or by changing the direction of force.

II. OBJECTIVES

A. To emphasize that machines may be used to change energy from one form to another.

B. To cause an understanding that the same amount of energy put into a machine is supplied by the machine, excluding friction.

C. To cause an understanding of machines increasing force.

D. To illustrate that machines may change the direction of a force.

E. To cause an understanding that machines make work easier.

F. To emphasize the importance of machines in our lives.

III. PROBLEM

To cause an awareness of the things that a machine can do.

IV. MORE FUN

A. Books
1. Tools in Your Life, Irvin Adler
2. Doing Work, Glenn O. Blough
3. Man and His Tools, William A. Burns
4. Machines at Work, Mary Elting
5. Everyday Machines and How They Work, Herman Schneider
6. Simple Machines and How They Work, Elizabeth N. Sharp

7. Things Around the House, Herbert S. Zim
8. Mechanical Man, Beril Becker
9. Machines, Jerome S. Meyer
10. Everyday Machines and How They Work, Herman Schneider

B. Films
1. Energy from the Sun, EBF
2. Nature of Energy, Coronet
3. Machines that Help Farmers, FA
4. Simple Machines, Levers, Coronet

C. Filmstrips
1. Levers, JH
2. Machines, EBF
3. Things in the World That Help Us, McGraw-Hill

LESSON TWENTY-NINE

I. CONCEPT:

Mississippi provides many natural resources.

II. OBJECTIVES:

A. To cause the student to learn some of the native Mississippi plants and animals.

B. To cause an awareness of the climate in Mississippi.

C. To bring to the attention of the students the many industries that are native to Mississippi.

D. To promote an awareness and appreciation by the students of the state in which they live.

III. PROBLEM:

To cause the student to develop a realization of the advantages of our state.

IV. MORE FUN:

A. Book

Mississippi: A History, John K. Bettersworth

B. Filmstrips

1. Development of Natural Resources In Mississippi, MFI
2. Forest Attractions In Mississippi, MFI
3. The Delta Country Where Cotton Is Grown, MFI
4. Travel In Mississippi, MFI

LESSON THIRTY

I. CONCEPT:

Evaluation is necessary to learn of the progress made during the year.

II. OBJECTIVES:

A. To choose the best phases of the year's work

B. To choose the best methods of presentation of the facts for future use

C. To find the best examples and subjects to be taught

D. To plan to use the best of all the work to be incorporated in another year's program

III. PROBLEM:

To learn the best of the lessons during the year

BOOKS FOR TEACHERS

Asimov, Isaac, The New Intelligent Man's Guide to Science, New York: Basic Books, Inc.

Blough, Glenn O. and Julius Schwartz, Elementary School Science and How To Teach It, New York: Holt, Rinehart and Winston, 1964.

Blough, Glenn O. and Albert Huggett, Elementary School Science and How To Teach It, New York: The Dryden Press.

Blough, Glenn O., Julius Schwartz, and Albert J. Huggett, Elementary School Science and How To Teach It (Revised Edition), New York: Holt, Rinehart and Winston.

Carin, Arthur, and Robert Sund, Teaching Science Through Discovery, Columbus, Ohio: Charles E. Merrill Books, Inc.

Craig, Gerald S., Science for the Elementary School Teacher, Boston: Ginn and Company, 1958.

Croxton, W. C., Science in the Elementary School, New York: McGraw-Hill Co., Inc.

Hone, Joseph and Victor, Teaching Elementary Science: A Source-book for Elementary Science, New York: Harcourt, Brace and World, Inc.

Navarra, John Gabriel and Joseph Zafforoni, Science Today for the Elementary School Teacher, New York: Harper & Row, 1963.

Tannebaum, Harold E., Nathan Stillman, and Albert Piltz, Science Education for Elementary School Teachers, Boston: Allyn and Bacon, Inc.

Victor, Edward, Science for the Elementary School, New York: Macmillan, 1965.

SUPPLEMENTARY MATERIALS

Aids for Health Teaching -
Health and Welfare Division
Metropolitan Life Insurance Company
1 Madison Avenue
New York, New York 10010

Algea in Water Supplies -
U. S. Public Health Series Service Publication No. 657
U. S. Printing Office
Washingtnn D. C. 20402 price $1.00

"Inside the Atom" -
Educational Relations Department
M W H General Electric Co.
Schenectady 5, New York

Periodic Chart of the Elementa -
Merck and Company
Rakway, New Jersey

Secure a card from the Bureau of Pharmaceutical Services telling how the public should deal with poison cases.
Bureau of Pharmaceutical Services
School of Pharmacy
University of Mississippi

Free classroom game, "Ring the Bell" -
Breakfast Game
Kellogg Company
Home Economics Services
Department 19-65
Battle Creek, Michigan 49016

"Working with Science" -
Department of Education
Jackson, Mississippi

List of Approved Materials for Elementary Science -
Department of Education
Jackson, Mississippi

"Let's Collect Rocks" -
"Let's Collect Shells" -
Shell Oil Company
P. O. Box 60193
New Orleans, Louisiana 70160

FILM AND FILMSTRIP COMPANIES

ALF	Almanac Films, Inc. 519 Fifth Avenue New York 18, New York
Barr	Arthur Barr Productions 6211 Arroyo Glen Los Angeles 42, California
CW	Churchill-Wexler Film Productions 801 North Seward St. Los Angeles 38, California
Cor	Coronet Films Coronet Building Chicago 1, Illinois
Birad	Birad Corporation 35 West 53rd St. New York 19, New York
EBF	Encyclopaedia Britannica Films 1150 Willmette Ave. Willmette, Illinois
IF	Instructional Films, Inc. 1150 Willmette Ave. Willmette, Illinois
Pictorial	Pictorial Films, Inc. 1501 Broadway New York 19, New York
Sterling	Sterling Films, Inc. 6 East 39th St. New York, New York

YAF	Young America Films, Inc. 19 East 41st St. New York 17, New York
Curr F	Curriculum Films American Educational Projections Corporation 1319 Vine St. Philadelphia, Penn.
EGF	Eye Gate House, Inc. 2716 41st St. Long Island City 1, New York
FH	The Filmstrip House 347 Madison Ave. New York 17, New York
CS	Charles Scribner's Sons Educational Dept. 597 Fifth Ave. New York 17, New York
KB	Knowledge Builders Visual Education Center Building Floral Park, New York
JH	Jam Handy Organization 2821 East Grand Boulevard Detroit 11, Michigan
PDP	Pat Dowling Pictures 1056 South Robertson Boulevard Los Angeles 35, California
SVE	Society for Visual Education, Inc. 1345 West Diversey Parkway Chicago 14, Illinois
UW-Educ	Educational Film Department United World Films, Inc. 1445 Park Ave. New York 29, New York

Cyanamid	American Cyanamid Co. Lederle Laboratories Division Pearl River, New York
Bailey	Bailey Films, Inc. 6509 De Longpre Ave. Hollywood 28, California
Bray	The Bray Studios, Inc. 729 Seventh Ave. New York 19, New York
FAC	Film Associates of California 10521 Santa Monica Boulevard Los Angeles, California 90025
Cenco	Cenco Educational Films 1700 Irving Park Road Chicago, Illinois 60613
PS	Popular Science Publishing Co. Audio-Visual Division 353 Fourth Ave. New York 10, New York
NAS	National Audubon Society 1130 Fifth Ave. New York 28, New York
IBF	International Film Bureau 57 East Jackson Boulevard Chicago 4, Illinois
NET	National Educational Television Film Service Indiana University Bloomington, Indiana
Moody	Moody Institute of Science 11428 Santa Monica Boulevard Los Angeles 25, California

TFC	Teaching Film Custodians, Inc. 25 West 43rd St. New York 36, New York
WLF	Wild Life Films 5149-5151 Stroln Ave. North Hollywood, California
MFI	Mississippi Filmstrip, Inc. Box 165 Natchez, Mississippi
VS	Visual Sciences Box 599-HW Suffern, New York
Photo Lab	Photo Laboratory, Inc. 3825 Georgia Ave., N.W. Washington, D. C.

BIBLIOGRAPHY

Asimov, Issac, The New Intelligent Man's Guide to Science, New York: Basic Books, Inc., 1960.

Bay Region Instructional Television for Education KQED Instructional Television Service, San Francisco.

Berkley United School District, Teacher's Guide for Science in the Primary Grades, Berkley, 1957.

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Mallinson, George G., Science 3, 4, 5, 6, Atlanta: American Book Company, 1965.

Navarra, John Gabriel, Science Today for the Elementary School Teacher, New York: Harper and Row, 1960.

Nelson, Leslie W., Science Activities for Elementary Children, Dubuque, Iowa: Wm. C. Brown Company, 1965.

Schneider, Herman and Nina, Science Series, Boston: D. C. Heath and Company, 1964.

South Huntington Schools, Science in the Elementary School, New York: Union Free School District No. 13.

Steck-Vaughn Science Series, Austin, Texas, 1961.

Tannenbaum, Harold E., Science Education for Elementary School Teacher, Boston: Allyn and Bacon, Inc., 1965.

Thurber, Walter A., Exploring Science, Atlanta: Allyn and Bacon, Inc., 1964.

Van Atta, Frieda E. V., How To Help Your Child In Grade School Science, New York: Random House, 1962.

Visner, Harold, Simple Science Experiments, Palisades, New Jersey: Franklin Publishing Company, Inc., 1960.

Webb, James E., What's Up There?, Washington: U. S. Government Printing Office, 1964.